White Paper Report

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NEH AIHEC's Advancing Knowledge
Native Knowledge Pathways Project

WHITE PAPER

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I.   Executive Summary

The American Indian Higher Education Consortium (AIHEC) with partners at Indiana University have designed and developed the Native Knowledge Pathways cultural objects database. The prototype "Native Knowledge Pathways Portal", now called "e-Humanity," is publically accessible at http://e-humanity.org. The project team will continue publicizing and field testing the "Native Knowledge Pathways/e-Humanity Portal" through 2013 (as resources permit) and is pursuing sustained revenues sources that will allow AIHEC and its partners maintain and continue development of the portal.

The portal developed by the Indiana University technical team has the essential functionality envisioned at the outset: it provides public access to the National Museum of the American Indian (NMAI) and the Southwest Museum of the American Indian digitized cultural materials. The Portal has both search capabilities and the ability for users to contribute annotations. Minor redesign tasks based on the outcome of the usability tests were recently completed.

The Native Knowledge Pathway Portal was developed to serve as a resource for the general public, but also specifically to serve the cultural education and preservation needs of American Indian tribes, particularly those served by the nation's tribal colleges and universities. The portal provides access to digitized images of American Indian cultural materials, and current information about the objects, such as name, use, geographic, and tribal origin. The portal is appropriate for use by students of all ages as well as the general public for educational purposes. It is particularly applicable for American Indian studies instructional support at the elementary through undergraduate levels.

The portal was developed using participatory design methodologies (e.g. usability testing). The portal is currently online and operative, managed by Indiana University,. The Project team recruited subject matter experts to provide guidance on portal development, including students and faculty members at tribal colleges and Northern Arizona University's Applied Indigenous Studies department faculty and students.

II.   Project Components

a. Database Federation
A large amount of effort was put into determining the feasibility of federating the NMAI and the Autry/Southwest Museum of the American Indian databases before it became clear that this was not going to be a workable solution for the portal. The latency period, the time it takes to do a search of both databases was determined to be prohibitively long and would discourage portal users. The alternate strategy of creating a combined data base with contributions from both museums was decided upon by the tech team.

The NMAI and Autry National Center databases were imported to an Indiana University server. The Indiana University development team developed a Representational State Transfer (REST) Application Programming Interface (API) that reads the data records from the Autry database in Alice, a database management application used by NMAI. The API retrieves the associated URLs, retrieves the image

records using the URLs, and enters the images into the Alice database. This utility updates the links in the Alice database so that the image and the metadata are correctly linked. The REST API allows scalable access to the data stored in the database.

Metadata Schema: It was determined that the metadata schemas used to support queries that address the NMAI, the Autry Museum, and additional databases that may be incorporated into the system in the future must support the usability requirements defined for the portal, and not just provide a simple extension of the existing schemas developed by the participating organizations/agencies whose collections are being accessed through the distributed database system.   Accordingly, i4i Inc. was contracted to assist with developing a customization of the Alice metadata management system for the project that will be based on the portal requirements. The customization was carried out using the Alice implementation currently hosted by NMAI. This was ported over to the Indiana University server when the customization was completed. As originally planned, Indiana University continues to host the distributed database/collaboration portal environment.

A REST API was developed that would allow scalable access to the data stored in the database. In the future, the data from other institutes will be imported in a specific format. This solution, with a little modification, will allow access to any other third party via the APIs developed for the project.

b. Portal Development

Core Technologies
Evaluation of technologies to be used for the portal were carried out and PHP/MySQL were selected as the core technologies used for development of the portal after thorough investigation of social networking websites, including YouTube, Facebook, LinkedIn among others.

User Management: User Management for the portal including registration through portal, single sign-on using Facebook and Google has been completed, including populating user profile data. Concepts related to different use-cases were developed. This included user engagement and/or social networking part where users would be able to create their own content and relate to the objects available through NMAI and Autry and form meaning for specific use-cases. These use-cases were converted into wireframes and tested using standard accelerated-development usability testing methods before being implemented.

Native Knowledge/e-Humanity Interface Concept: The e-Humanity interface concept was developed during several iterations with feedback from the local Native-American community. Secondary and exemplar research also played a major part in generating useful design insights. A lot of sketches, wireframes, and other interface ideas were developed and after careful consideration the interface was designed and developed. Quick user testing during the developmental phase led to useful and candid feedback that helped change the design early on. The e-Humanity portal is currently developed as a base product on top of which different features can be developed only after a formal usability session is conducted with the *typical users* i.e. Native-American community members, students, faculty etc.

e-Humanity Subject Matter Experts Recruitment: Subject Matter Experts were recruited to assist in the overall development and ongoing improvement of the Native Knowledge Pathways Portal. Subject Matter Experts, within the e-Humanity context, were defined as people who have subject matter expertise related to the Native-American culture, art, customs etc. A list consisting of emails of several Native-American museums or tribal colleges was developed, which was used to send out information about the e-Humanity

portal and invite Subject Matter Experts to join the project. Indiana University has recruited at least two Subject Matter Experts.

User-generated content: The Indiana University development team is finalizing the Native Knowledge Pathways Portal with the additional capability of supporting user-generated content. This function includes the ability to upload and import images from several social media sites such as Google Picasa, Facebook, Twitter, and Flickr in addition to manually uploading media directly. The development involves a huge amount of effort in gaining familiarity with the different APIs (.

A preliminary set of data from the Autry and the National Museum of the American Indian were imported into the project database as a pilot set for development and testing. Datasets from Autry and the National Museum of the American Indian (NMAI) are now being imported into the MySQL database at Indiana University on an on-request basis. These include the actual media (e.g. images) and associated metadata.

e-Humanity Features:
Features developed for the portal include:

- Browse: You are able to browse the entire collection by default items with only images. When you uncheck 'Only Images", it will also return results that do not have any image. One can also use filters by location, date, and culture.
- Activity Feed: Tells the user what people have been doing on the portal, and only works if the user is logged in. Users can directly post on an artifact in activity feed without going to the artifact page.
- Search: Implemented search similar to Google search with full auto-suggestions.
- Feedback Form: This allows user to send feedback to the development team.
- Contact Us: This allows any logged in user to contact the development team.
- Featured Artifacts: This section is present on the home page and displayed all the featured artifacts based on an automated system in the backend. It includes user searches, random entries, and other variables that are captured.
- Profile: Profile page contains publicly available information about the user itself that includes Occupation, Bio, and Location. These fields are editable by the user. In addition, it also contains the following items:
    - Collection: Allows a user to see the items in his/her collection. These artifacts are added by clicking on the "Add to Collection" button on an artifact's page.
    - Account Settings: This will allow user to disable email notifications from e-Humanity that is related to replying or liking a post.
    - Recent Activity: This allows a user to track your entire activity on the portal.
    - Notifications: This allows the users to see if other online logged-in users replied to or liked their post/comments.
    - Apply to be an Expert: This button allows any general user to apply as an SME
- Login: Users have the option to either create an account through e-Humanity via our email verifications system or login via their Google or Facebook accounts.
- Share the Artifact: This allows users to share the artifact on Facebook and a host of other social networking websites.

The e-Humanity logo was designed and feedback was collected to modify it accordingly.

c. Usability Testing

The primary method for evaluation of the cultural portal has been through usability testing. This testing has been done both one-on-one and in a focus-group setting. Individuals being tested were asked to navigate through the portal during which a set of interview questions were asked that elicit responses to various aspects of the portal, including design, quality of information provided, ease of navigation.

AIHEC and Indiana University organized extensive usability testing of the portal by various groups in various regions and expertise. This array of participants allowed for comprehensive feedback on the usability of the portal. AIHEC and Indiana University coordinated three review teams to review and analyze the portal. The participants in the testing were faculty and students. Usability testing participants were:
1. United Tribes Technical College in Bismarck ND;
2. Institute of American Indian Arts in Santa Fe, New Mexico;
3. Northern Arizona University in Flagstaff, Arizona,

The results of usability testing were used in successive redesign iterations of the portal. For example, several subjects objected to the use of the term "artifact" to describe objects in the repository. The term was seen to be disrespectful and dismissive of the objects as a part of the tribe's living culture. The term was removed. This testing was essential to ensuring that the portal provides a positive user experience.

A primary source of data for evaluating the portal is the number of visitors to the site, particularly those that register and return on a regular basis. We are seeing a fair amount of traffic from visitors who come to explore the site, but are seeing relatively light traffic by users who register and continually return to the site. Please see Attachment C for audience overview. The portal seems to be too much like a museum, in which interesting images can be found and examined, but which doesn't sufficiently engage the user. Providing a stronger social networking dimension, in which users can participate in conversations about the objects within the larger context of tribal culture and history, has been identified as one critical need for developing the portal audience. For this we see the role of tribal educators to be critical, particularly culture and language instructors. They would be able to provide a much broader and significantly more in-depth context for the objects, which could be done through a variety of means, such as regular blogs and threaded discussions. These strategies are being explored.

User research: User research was conducted on the target audiences including American Indian students and some museums to find out the context in which they would like to use the information about cultural objects. A usability requirements survey questionnaire was developed by Indiana University, and was completed by the advisory committee. A series of planning conference calls were conducted subsequent to the analysis of the survey results to discuss the survey and more generally the portal usability requirements in greater detail. Based on this input, the Indiana University design team developed a mock-up of the portal design which the advisory team reviewed and responded with additional design recommendations.

III. Continuation of the Project

Building a community of museums: The project team is exploring the feasibility of recruiting tribal college and tribal museums that would subscribe to the e-Humanity portal service. The idea is to provide a version of the portal that is customized specifically for a single tribe, serving as the tribe's e-museum. This would provide revenue needed to sustain the portal, and would provide a wealth of input from specific tribal audiences that would drive further development and design of portal features.

Emerging technologies: The rapid emergence of mobile devices – smartphones and tablets – as the dominant means for accessing Internet resources requires that a mobile version of e-Humanity be developed in order to maintain any prospect of developing a significant user base. The e-Humanity technical team continues to monitor trends in mobile technologies and mobile applications, but development of a e-Humanity mobile version is contingent on securing additional funding.

The portal has generated an important discussion about the role of technology in promoting and preserving American Indian language and culture. It is clearly recognized by AIHEC and the tribal colleges that technology must be used strategically to maintain access to cultural knowledge and resources at a time when the human cultural knowledge base – the elders – is declining. The portal is an important first step, but much work remains to be done to design the resource in a way that ensures that cultural resources can represent an authentic component of living culture well into the future.

The project is motivating a number of follow-on experiments, such as online courses, e-museums, massive online open courses (MOOCs), involving new partners and emerging technologies. The long-term impact of the project is in facilitating and strengthening the collaborative relationships between the tribal colleges, tribal museums, and national technology leaders as we continue the effort to promote Native language and culture and preserve them for future generations.